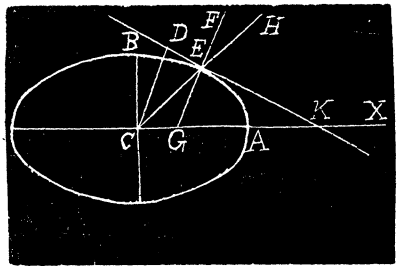
$CB=b$, $\angle ECA=\theta$, $\angle DCE=\angle CEG=\phi$, $\angle EKX=\beta$, co-ordinates of $E=(x,y)$.



Then $\tan\beta=-\dfrac{b^2x}{a^2y}$, $\tan\theta=\dfrac{y}{x}$, also $\beta=90^\circ+\theta+\phi$, $\tan\beta=\tan(90^\circ+\theta+\phi)$

$$=-\cot(\theta+\phi).$$

$$\therefore\ \frac{b^2x}{a^2y}=\cot(\theta+\phi)=\frac{\cot\theta\cot\phi-1}{\cot\theta+\cot\phi}$$

$$=\frac{\dfrac{x}{y}\cot\phi-1}{\dfrac{x}{y}+\cot\phi}.$$

$$\therefore\ \tan\phi=\frac{a^2-b^2}{a^2b^2}xy=\text{maximum}\ldots.(1).\qquad \frac{x^2}{a^2}+\frac{y^2}{b^2}=1\ldots.(2).$$

The first differentials of (1) and (2) give $b^2x^2=a^2y^2$.

$$\therefore\ x=\frac{a}{\sqrt{2}},\ y=\frac{b}{\sqrt{2}},\ \therefore\ \tan\theta=\frac{b}{a}=(.9933254)^{\frac{1}{2}}=.996659,\ \therefore\ \theta=44^\circ\ 54'\ 14''.9=\text{the latitude}$$

$$\tan\phi=\frac{a^2-b^2}{2ab}=\frac{.0066746}{1.993318}=.003348,\ \therefore\ \phi=1'\ 30''.5$$

= maximum angle made with the perpendicular.

Also solved by Professor *C. W. M. Black* and the *Proposer*.

PROBLEMS.

36. Proposed by H. C. WHITAKER, B. Sc., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

A cube is revolved on its diagonal as an axis. Define the figure described and calculate its volume.

37. Proposed by J. A. CALDERHEAD, Superintendent of Schools, Limaville, Ohio.

A man ties two mules—one to the outside of a circular wall, the other to the inside. If the lengths of the ropes of each is one-fourth the circumference of the wall, and both together can graze over one acre of ground: find the circumference of the wall.